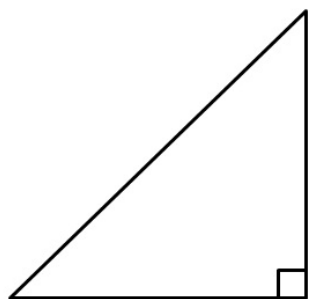


2.6 Related Rates Problem Set

Show all work to receive full credit! Provide units!

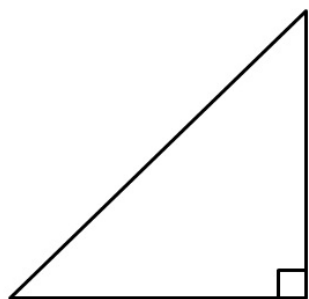
The Kite

A kite is moving horizontally away from the person flying it with a speed of $7 \frac{m}{\text{sec}}$ at an altitude of 30 m. Determine how fast the string is being let out when the kite is 50 m from the kite flyer.



The Falling Kite

A kite is falling vertically with a speed of $5 \frac{m}{\text{sec}}$ and being blown horizontally at $7 \frac{m}{\text{sec}}$ away from the person holding the string while it is at an altitude of 30 m. Determine the speed with which the string is being let out or taken in when the kite is 50 m from the kite flyer.

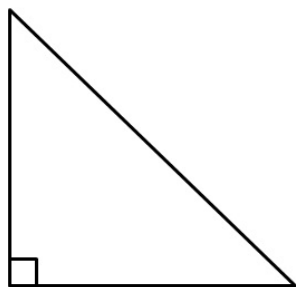


The Sliding 13-ft Ladder

A 13 ft ladder rests against the side of a house. When the base of the ladder is 5 ft from the base of the house it is moving with a velocity of $3 \frac{\text{ft}}{\text{sec}}$ away from the house.

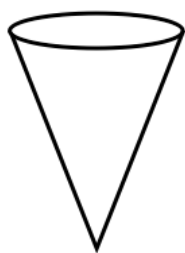
Determine:

- How fast the top of the ladder is moving
- The rate at which the area under the ladder is changing
- The rate at which the slope of the ladder is changing



The Inverted Cone

Water is dripping out of an inverted cone at a rate of $2 \frac{\text{ft}^3}{\text{min}}$. The cone has an altitude of 10 ft and a base with a diameter of 6 ft. When the water is halfway down the cone, determine how fast the height of the water is falling.



Hole Lotta Can

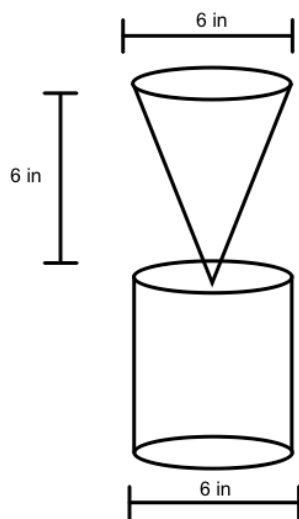
An aluminum can full of liquid has sprung a leak of $10 \frac{\text{in}^3}{\text{min}}$. The can has a height of 10 in and a radius of 4 in. What is the rate at which the height of the liquid is falling?



Making Coffee

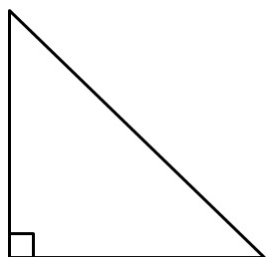
Coffee is draining from a conical filter into a cylindrical coffee pot at a rate of $10 \frac{\text{in}^3}{\text{min}}$.

- How fast is the level in the pot rising when the coffee in the cone is 5 in deep?
- How fast is the level in the cone falling when the coffee in the cone is 5 in deep?



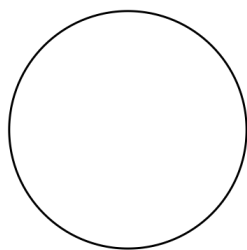
The Walkers

A and B are walking on straight streets that meet at right angles. A approaches the intersection at $2 \frac{m}{\text{sec}}$. B moves away from the intersection at $1 \frac{m}{\text{sec}}$. At what rate is the angle θ (the angle opposite A's path) changing when A is 10 m from the intersection and B is 20 m from the intersection? (Express your answer to the nearest degree)



The Pebble

A pebble is dropped into a calm pool, causing ripples in the form of concentric circles. The radius of the outer ripple is increasing at a constant rate of $1 \frac{ft}{\text{sec}}$. When the radius is 4 ft, at what rate is the total area of the disturbed water increasing?



The Balloon

Air is being pumped into a spherical balloon at a rate of $4.5 \frac{in^3}{\text{min}}$. Find the rate of change of the radius when the radius is 2 in.

